Structural Change for Growth of Small Agro-Processing Firm: A Case of Morogoro and Mbeya, Tanzania

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Abstract: The growth of small agro-processing firms in Mbeya and Morogoro regions was regarded the same with similar factors. This could not be true due to extent of factors affecting growth of value of processed products being different. This study therefore tested for structural change for growth of small agro-processing firms in Mbeya and Morogoro Tanzania. The study used time series data from TRA and SIDO. Results showed that, there are differences of extents of factors affecting growth of small agro-processing firms between Mbeya and Morogoro, Tanzania. This paper therefore recommends that, the government and other stakeholders should note the differences of factors affecting growth of small agro-processing firms from one region to other hence addressing the growth problems of small agro-processing firms according to the extents of effects caused by each factor.

Key words: Structural change, growth of small agro-processing firms, Mbeya, Morogoro, Tanzania.

Introduction
Structural change is associated with changes that affect disaggregate units (Kruger, 2008). These changes are generally of different extent for each single unit, since otherwise the composition of the aggregate would not change. Second, these differential changes are relevant in the long run, making structural change an important aspect of economic growth (Kruger, 2008). Taken together, structural change in the economy implies that some industries or sectors experience faster long-term growth than others, leading to shift of the shares of these industries or sectors in the total aggregate.

Structural change for growth of small agro-processing firms refers to change of value of processed products due to extents of different factors like raw-materials, energy and labour productivity in different areas. The growth of small agro-processing firms in Mbeya and Morogoro regions was regarded the same with similar factors (URT, 2010 and 2012). This could not be true due to nature of factors affecting growth of value of processed products such as cost of raw-materials, energy cost and quality of human labour used in processing products affects the values in different circumstance.

Different studies including Kipene eta el., (2015) indicated that value of processed products growth differs from one region to another but they didn’t indicated if the factors affecting growth are in similar extents of effects. This study therefore analysed if the similar factors with similar extent affects growth of firms in both regions by testing for structural change.

Test for structural change
The test for structural change is an econometric test. It is used to verify the equality of coefficients in separate subsamples (Maasoumi eta el., 2010). This is done by checking parameter stability of economic models. In order to test for the stability of a relationship between a dependent variable and the independent variables a researcher selects the potential breakpoint of the relationship desired to be tested. If there is no structural change, we would expect that the estimated residuals from a regression using the entire data would not differ from the combined residuals. On other hand if indicates a break in data then structural change has occurred. From a statistical perspective, the null hypothesis for the CHOW test is that the subset regression slope coefficients, $\beta_1$ and $\beta_2$ are equal, and thus the subsets can be viewed as one dataset. Alternatively, the nature of relationship has changed.
Methodology

The study tested structural change by Chow test method. This method is good in finding minor differences of relationships between independent and dependent variables. The study used time series data from TRA and SIDO. Based on the Chow test, the model was run to test for structural change between Morogoro and Mbeya in terms of growth of agro-processing firms, the sets of three regression equations were presented below; The model in equations (1) and regressions data were adopted from study of (Kipene et al., 2015).

Whole sample

\[ Y_1 = b_{01} + B_1Z_{11} + B_2Z_{21} + \ldots + B_7Z_{71} \cdots (1) \]

Mbeya (region1)

\[ Y_2 = b_{02} + B_1Z_{12} + B_2Z_{22} + \ldots + B_7Z_{72} \cdots (2) \]

Morogoro (region 2)

\[ Y_3 = b_{03} + B_1Z_{13} + B_2Z_{23} + \ldots + B_7Z_{73} \cdots (3) \]

The Chow test was used to test for structural change based on statistical difference between corresponding parameters estimates for Morogoro, Mbeya and the whole sample. The F test for structural change is given in equation (4).

\[
F( k, n_1 + n_2 - 2k) = \frac{1}{(n_1 + n_2 - 2k)} \left( \frac{SSE_R - SSE_1 - SSE_2}{k} \right)
\]

Where:

- \( SSE_R \) = the sum of squared error for the entire sample.
- \( SSE_1 \) = the sum of squared error for Mbeya region
- \( SSE_2 \) = the sum of squared error for Morogoro region
- \( n_1 \) = the number of observation for Mbeya region (\( n_1 = 56 \))
- \( n_2 \) = the number of observation for Morogoro region (\( n_2 = 50 \))
- \( K \) = the number of regressors, including the intercept (\( K = 8 \))

The testable hypothesis was:

\[
H_0 : \beta_{11} = \beta_{12} = \ldots = \beta_{17} = 0
\]

The calculated F-value was compared with the critical value from the corresponding F-Table. The null hypothesis being tested in this case is that; if regression coefficients for Mbeya and Morogoro regions are similar, they will also be similar to those of the whole sample, which will reflect structural similarities in the growth of small agro-processing firms between the two regions (or no structural difference between the two regions). If the null hypothesis is rejected; it means the growth of small agro-processing firms represented by the elasticities of production of the dependent variables is different with different extent between Mbeya and Morogoro regions.

Results and Discussion

This study examined if the factors affecting growth of small agro-processing firms had the same effect in Mbeya and Morogoro by comparing the parameters pair wise using a t test and for the entire models based on the Chow test for structural change. Three models were run for this test according to the equation (4). The model was tested for stationarity indicating absence of multicollinearity for the whole sample (VIF 1.13 and CI 2.3, for Mbeya region (VIF 1.14 and CI 2.65), and for Morogoro Region (VIF 1.33 and CI 4.15). The model was also tested for autocorrelation and heteroskedasticity using the Newey-West standard errors method (Hoechle, 2007). A Durbin-Watson statistic of 2.59, for the whole sample, 2.34, for Mbeya region and 2.23 and for Morogoro Region, all was above the critical tabulated values, which indicates absence of serial autocorrelation (Studenmund, 2001; Gujarath, 2004 and Hoechle, 2007).

The adjusted \( R^2 \) value for the whole sample was 0.68 comparable to 0.67 for Mbeya region and 0.71 for Morogoro Region. This implies about 68% of the variation in the growth of value of products from small agro-processing firms in the whole sample was accounted by the variation in the independent variables as well as 67% for Mbeya region and 71% for Morogoro Region. The intercept was 5.095 for the whole sample, 5.978 for Mbeya Region and 6.101 for Morogoro Regions significantly different from zero (\( \alpha < 0.01 \)). All seven variables had the expected signs and four variables had a significant effect on variation of growth of value of products as indicated in Table 1.

The computed F-value for the Chow test was 5.94 being greater than the critical value of 2.25 for 6 degree of freedom at \( \alpha = 0.05 \) significance level. Based on these findings the null hypothesis was rejected, indicating that parameters estimates for Mbeya and Morogoro Regions are significantly different from each other, which reflects the existence of structural difference between the two regions for the growth of small agro-processing firm.

The results on Table 1 show that, if labour productivity increased by one percent, the value of processed products was likely to increase by 0.55 in Mbeya, by 0.52 in Morogoro compared to 0.55 for the whole sample. The difference between Mbeya and Morogoro regions is 0.03. The value of
raw-materials was also seen to cause changes in the value of products by difference of 0.003% between the regions. Likewise firms that operated for a long time were more likely to increase the value of products by a difference of 0.06% between Mbeya and Morogoro. Contrary to these findings, one percent increase for the cost of energy was likely to decrease the value of products by difference of 0.01% between the regions.

Table 1: Structural change for growth of small agro-processing firms (2011-2012)

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Expected Sign</th>
<th>Whole sample Coefficient</th>
<th>Mbeya Coefficient</th>
<th>Morogoro Coefficient</th>
<th>T test</th>
<th>T test</th>
<th>T test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour productivity</td>
<td>(+)</td>
<td>0.522***</td>
<td>0.556***</td>
<td>0.521***</td>
<td>8.811</td>
<td>6.332</td>
<td>5.617</td>
</tr>
<tr>
<td>Value of raw-materials</td>
<td>(+)</td>
<td>0.308***</td>
<td>0.303***</td>
<td>0.300***</td>
<td>5.221</td>
<td>3.414</td>
<td>3.625</td>
</tr>
<tr>
<td>Number of years in operation</td>
<td>(+)</td>
<td>0.313***</td>
<td>0.308***</td>
<td>0.368***</td>
<td>5.264</td>
<td>3.468</td>
<td>4.023</td>
</tr>
<tr>
<td>Capital invested per firm</td>
<td>(+)</td>
<td>0.011</td>
<td>0.045</td>
<td>0.062</td>
<td>0.190</td>
<td>0.539</td>
<td>6.780</td>
</tr>
<tr>
<td>Cost of energy per firm</td>
<td>(-)</td>
<td>-0.167***</td>
<td>-0.181***</td>
<td>-0.191***</td>
<td>-2.751</td>
<td>-2.082</td>
<td>-2.000</td>
</tr>
<tr>
<td>If a firm operated infrequently (weekly)</td>
<td>(-)</td>
<td>-0.006</td>
<td>-0.0733</td>
<td>-0.100</td>
<td>-0.100</td>
<td>-0.130</td>
<td>-1.192</td>
</tr>
<tr>
<td>If a firm was not managed by owner</td>
<td>(+)</td>
<td>0.062</td>
<td>0.020</td>
<td>0.136</td>
<td>1.098</td>
<td>0.237</td>
<td>0.154</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>106</td>
<td>56</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( R^2 ) Adjusted</td>
<td></td>
<td>0.68</td>
<td>0.67</td>
<td>0.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compute F-values</td>
<td></td>
<td>33.794***</td>
<td>14.49***</td>
<td>18.49***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td>2.589</td>
<td>2.341</td>
<td>2.229</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIF</td>
<td></td>
<td>1.13</td>
<td>1.142</td>
<td>1.325</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition Index</td>
<td></td>
<td>2.3</td>
<td>2.651</td>
<td>4.147</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chow Test</td>
<td></td>
<td>= 5.940</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other variables such as; capital invested per firm and if a manager was not the owner had positive coefficients but they did not have a significant influence on value growth of processed products variation.

A one percent increase in the amount of capital invested per firm could change the value of products by a difference of 0.07% between the regions, compared to if a manager was not an owner; could cause changes of value of products by a difference of 11.6%. The status of firms operations per week had a negative coefficient but was not significant implying that, if a firm operated infrequently could decrease value of products by difference of 2.7% between Mbeya and Morogoro Regions.

Conclusion and Recommendation
This study evaluated structural change of the growth of small agro-processing firms in Mbeya and Morogoro regions of Tanzania. The growth of small agro-processing firms was expressed as the value of processed products per year. The evaluation of structural change was done by Chow test where factors affecting growth of small agro-processing firms were tested. Based on this criteria, there are differences of extents of factors affecting growth of small agro-processing firms between Mbeya and Morogoro, Tanzania. This has been attributed by differences in costs of acquiring raw-materials, followed by differences of labour productivity and number of years in operations. The pricing cost of energy had also different impact on firms’ growth between Mbeya and Morogoro, Tanzania.
It is therefore recommended that the government and stakeholders should note that there are differences in the extents of factors which affect growth of small agro-processing firms hence not necessarily to use similar methods to address the problems of firm’s growth all over the country. As the factors could be the same but it affects differently. Therefore when addressing the factors affecting growth small agro-processing firms, the treatment should depend to the extent of effect in each region. For a case of the problem of energy cost could be addressed by allocating more funds to expedite the on-going programme under Rural Electrification Agency (REA) to reach areas that are not yet connected with electricity, since the charge of using electricity from Tanzania Electrical Supply Company - TANESCO is in constant basis all over the Tanzania regions.

**REFERENCE**


